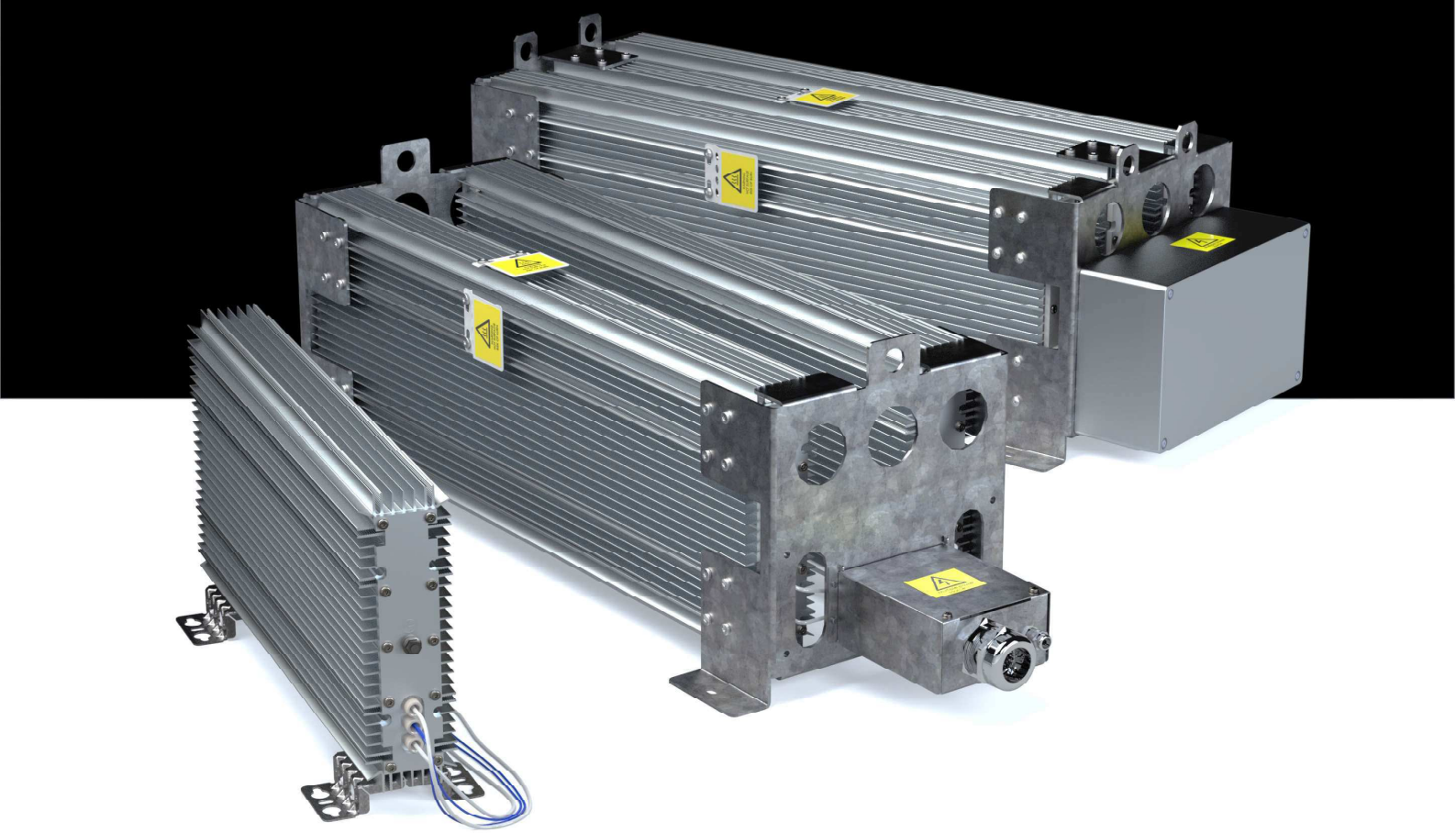
DANOTHERM™



CBT-H / CBT-V

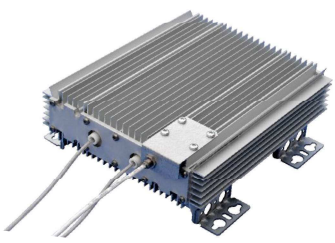
- Brake resistors

- General-purpose application; High pulse load and High average load
- Compact Construction; small dimensions
- Fully insulated; no external life parts
- High IP Classes
- Low thermal drift, 130ppm
- Fail Safe capabilities on request
- Low noise
- Thermal models for all types available on request
- Resistor components are UL approved

Pn [W] @ 40°C According UL508							
CBT-BH(T)-XXX	1 body Pn [W] @ 40°C According UL508	max case temp. [°C]	R [Ω] min - max ± 10%	Pn [W] @ 40°C			
				1 case	2 cases	3 cases	4 cases
TS: Thermal switch	no TS			TS 200°C	no TS, max case temp. 250°C		
CBT 180	455	270	0.015 - 15	410			
CBT 210	585	270	0.02 - 2000	530			
CBT 260	830	280	0.04 - 2000	750			
CBT 330	1350	280	0.06 - 2000	1225			
CBT 400	1650	290	0.07 - 2000	1495	2200	3000	4000
CBT 460	1900	300	0.09 - 2000	1725	2800	4200	5600
CBT 560	2310	310	0.12 - 170	2095	3500	5200	6900
CBT 660	2720	320	0.15 - 210	2470	4200	6300	8400
CBT 760	3200	330	0.18 - 250	2905	5000	7200	9600
CBT 860	3640	340	0.2 - 300	3305	5500	8000	10800
CBT 960	4070	350	0.25 - 340	3695	6900	9000	12000

Construction and properties

- Compact dimensions
- Nominal power range from 455W–4070W
- Energy levels from 25kJ-550kJ per case housing (5s duty,120s cycle), depending on ohm value
- Aluminium case housing for high IP rating
- IP50-IP65
- Internal ceramic supported wirewound spirals for lower ohm values
- Internal mica supported wirewound elements for higher ohm values
- Nickel-Chrome 8020 alloy for low thermal drift
- Mica insulated for high dielectric strength
- Al_2O_3 or SiO_2 filled for high thermal capacity/ high power overload capability
- Low surface temperature
- Low noise level
- High vibration withstand capability
- Thermal relief expansion mounting feet
- Optional thermal switch or PT100 element for thermal protection guard.
- Cable (AWG 14–AWG4) or box connection up to 50mm²
- Multiple case housings (from 2-4 housings)
- Customized to your needs and application (OEM versions available)
- For UL approval, consult Danotherm

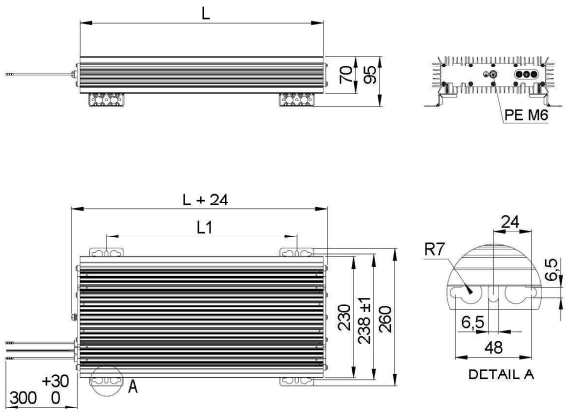


General specifications		
Temperature Coefficient:		< ± 100 ppm
Dielectric strength		3500 VAC @ 1 minute
Isolation Resistance:		> 20MΩ / case housing
Overload:@ 1 sec pulse / hour		70 - 250 x (depending on resistor)
Overload:@ 5 sec pulse / hour		20 - 60 x (depending on resistor)
Environmental:		- 40 °C - 70 °C
De-rating cable version		Linear: 40°C = Pn to 70°C = 0.85 * Pn
De-rating TW 200°C version		Linear: 40°C = Pn to 70°C = 0.65 * Pn
De-rating vertical mounting		no de-rating
De-rating horizontal mounting		0.8 * Pn
De-rating at high altitudes	1000 m	no de-rating
	1500 m	0.94 * Pn
	3000 m	0.82 * Pn
Mounting instructions		It is recommended to keep a distance of 200mm to the nearest object to prevent heating of a neighbor component.
		If two or more brake resistors are mounted next to each other the distance between these should be 400mm. If this is less then the nominal power needs to be de-rated.
Cooling		The nominal power of the resistors refers to cooling conditions with Free Natural Air Cooling.
Vibration		Acc. To EN 60068-2-6 frequency range 1 - 100Hz Acceleration / Amplitude
	1 - 13 Hz	± 1mm
	13 - 100 Hz	@ ± 0.7G
Corrosive resistance		Acc. EN 60721-2-1: C2 medium
Connection recommendations		To minimize EMC interference screened cables are recommended. in particular with any PWM brake pattern.
Resistance tolerance		± 10% (optional 5%)
Working voltage	cable ver-	UL: 1000VAC. IEC: 1000VAC / 1400VDC
	conn. Box	UL: 600VAC. IEC: 690VAC / 1100VDC
Time constant for heating up resistor		1000 - 3000s
Thermal switch (optional)	Thermal switch	130 / 160 / 180 / 200 °C. 2A. 250 VAC NC
Minimum measuring voltage		2V
Minimum measuring current		10mA
Rated current / voltage		2.5A @ 250 VAC cos ϕ=1
Dielectric voltage		2000VAC (3500VAC between TS and R)
Temperature requirements on cables	IP 21	80°C
	IP 65	90°C

PN	P	single-body style	L ± 2	L1 ±	Weigh	Resistance Range
kW	kW	Type	mm	mm	kg	Ω
0,45	6	CBT-H 180 C(H)(T) 0X1	180	70	3,1	0,015-12
0,58	10.1	CBT-H 210 C(H)(T) 0X1	210	110	3,6	0.025-400
0,83	17,9	CBT-H 260 C(H)(T) 0X1	260	160	4,5	0,040-700
1,35	27.5	CBT-H 330 C(H)(T) 0X1	330	230	5,9	0,075-1000
1,65	37	CBT-H 400 C(H)(T) 0X1	400	300	7,3	0,10-1400
1,9	48	CBT-H 460 C(H)(T) 0X1	460	360	8,5	0,15-1600
2,3	58	CBT-H 560 C(H)(T) 0X1	560	460	10	0,15-110
2,7	69	CBT-H 660 C(H)(T) 0X1	660	560	12	0,20-130
3,2	82	CBT-H 760 C(H)(T) 0X1	760	660	13,8	0,25-150
3,6	95	CBT-H 860 C(H)(T) 0X1	860	760	16	0,30-180
4,1	111	CBT-H 960 C(H)(T) 0X1	960	860	17,8	0,35-200

* Pulse rating depends on resistance value

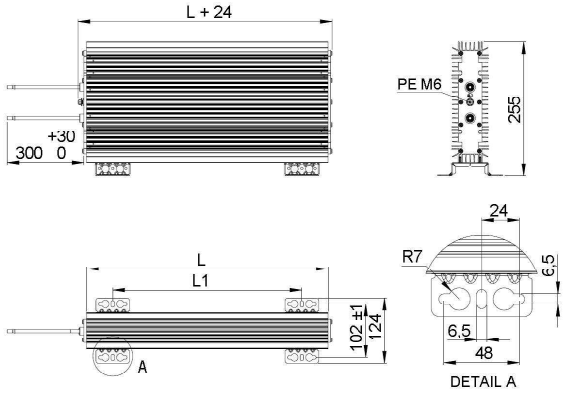
CBT-H ..C..



PN	P 5/120*	single-body style case with cables	L ± 2	L1 ± 2	Weight (SiO2)	Resistance Range
kW	kW	Type	mm	mm	kg	Ω
0,45	6	CBT-V 180 C(H)(T) 0X1	180	70	3,1	0,015-12
0,58	10.1	CBT-V 210 C(H)(T) 0X1	210	110	3,6	0.025-400
0,83	17,9	CBT-V 260 C(H)(T) 0X1	260	160	4,5	0,040-700
1,35	27.5	CBT-V 330 C(H)(T) 0X1	330	230	5,9	0,075-1000
1,65	37	CBT-V 400 C(H)(T) 0X1	400	300	7,3	0,10-1400
1,9	48	CBT-V 460 C(H)(T) 0X1	460	360	8,5	0,15-1600
2,3	58	CBT-V 560 C(H)(T) 0X1	560	460	10	0,15-110
2,7	69	CBT-V 660 C(H)(T) 0X1	660	560	12	0,20-130
3,2	82	CBT-V 760 C(H)(T) 0X1	760	660	13,8	0,25-150
3,6	95	CBT-V 860 C(H)(T) 0X1	860	760	16	0,30-180
4,1	111	CBT-V 960 C(H)(T) 0X1	960	860	17,8	0,35-200

* Pulse rating depends on resistance value

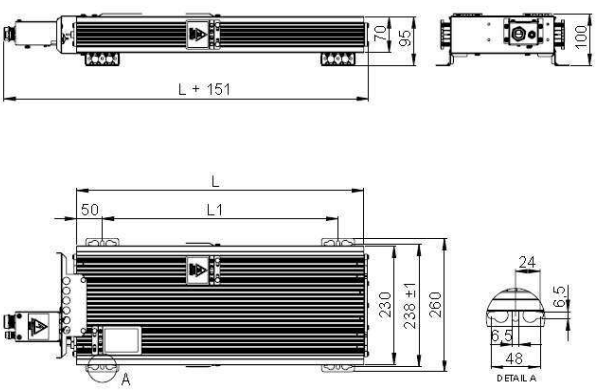
CBT-V..C..



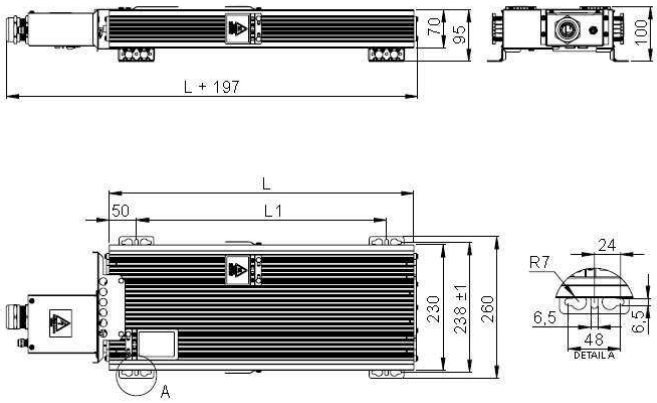
PN	P 5/120*	single-body style case with D-Box IP21	L ± 2	L1 ± 2	Weight (SiO2)	Resistance Range
kW	kW	Type	mm	mm	kg	Ω
0,45	6	CBT-H 180 D(H)(T) 2X1	180	70	3,9	0,3-12
0,58	10.1	CBT-H 210 D(H)(T) 2X1	210	110	4,2	0.4-400
0,83	17,9	CBT-H 260 D(H)(T) 2X1	260	160	5,1	0,6-700
1,35	27.5	CBT-H 330 D(H)(T) 2X1	330	230	6,7	0,9-1000
1,65	37	CBT-H 400 D(H)(T) 2X1	400	300	8.2	1,1-1400
1,9	48	CBT-H 460 D(H)(T) 2X1	460	360	9.2	1,2-1600
2,3	58	CBT-H 560 D(H)(T) 2X1	560	460	11	1,5-110
2,7	69	CBT-H 660 D(H)(T) 2X1	660	560	12.8	1,8-130
3,2	82	CBT-H 760 D(H)(T) 2X1	760	660	14.6	2,0-150
3,6	95	CBT-H 860 D(H)(T) 2X1	860	760	16.8	2,3-180
4,1	111	CBT-H 960 D(H)(T) 2X1	960	860	18,6	2,6-200

* Pulse rating depends on resistance value

CBT-H..D..1



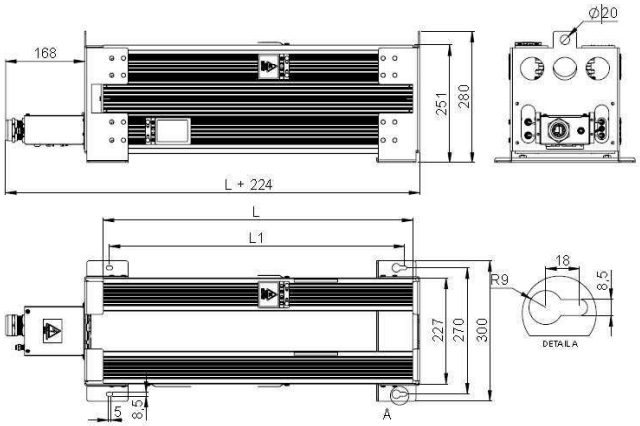
CBT-H ..G..1



PN	P 5/120*	single-body style case with G-Box IP21	L ± 2	L1 ± 2	Weight (SiO2)	Resistance Range
kW	kW	Type	mm	mm	kg	Ω
0,45	6	CBT-H 180 G(H)(T) 2X1	180	70	3,9	0,3-12
0,58	10.1	CBT-H 210 G(H)(T) 2X1	210	110	4,2	0.4-400
0,83	17,9	CBT-H 260 G(H)(T) 2X1	260	160	5,1	0,6-700
1,35	27.5	CBT-H 330 G(H)(T) 2X1	330	230	6,7	0,9-1000
1,65	37	CBT-H 400 G(H)(T) 2X1	400	300	8.2	1,1-1400
1,9	48	CBT-H 460 G(H)(T) 2X1	460	360	9.2	1,2-1600
2,3	58	CBT-H 560 G(H)(T) 2X1	560	460	11	1,5-110
2,7	69	CBT-H 660 G(H)(T) 2X1	660	560	12.8	1,8-130
3,2	82	CBT-H 760 G(H)(T) 2X1	760	660	14.6	2,0-150
3,6	95	CBT-H 860 G(H)(T) 2X1	860	760	16.8	2,3-180
4,1	111	CBT-H 960 G(H)(T) 2X1	960	860	18,6	2,6-200

* Pulse rating depends on resistance value

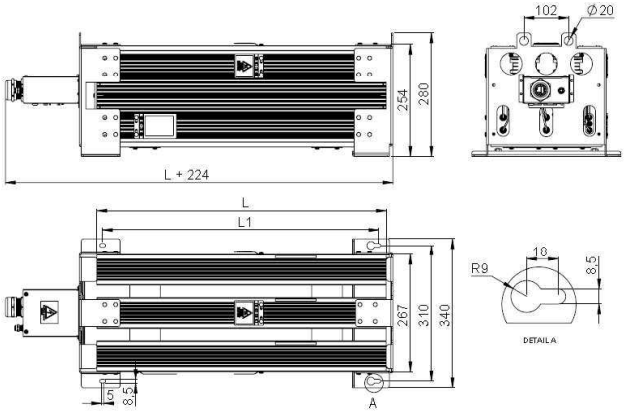
CBT-V ..G..2



PN	P 5/120*	double-body style case with G-Box IP21	L ± 2	L1 ± 2	Weight (SiO2)	Resistance Range
kW	kW	Type	mm	mm	kg	Ω
2,2	50	CBT-H 400 D(H)(T) 2X2	400	300	18	0,55-700
2,8	60	CBT-H 460 D(H)(T) 2X2	460	360	20.5	0,6-800
3,5	80	CBT-H 560 D(H)(T) 2X2	560	460	23.5	0,75-55
4,2	95	CBT-H 660 D(H)(T) 2X2	660	560	27	0,9-65
5,0	110	CBT-H 760 D(H)(T) 2X2	760	660	30.5	1,0-80
5,5	125	CBT-H 860 D(H)(T) 2X2	860	760	35.5	1,15-90
6,9	150	CBT-H 960 D(H)(T) 2X2	960	860	39	1,3-100

* Pulse rating depends on resistance value

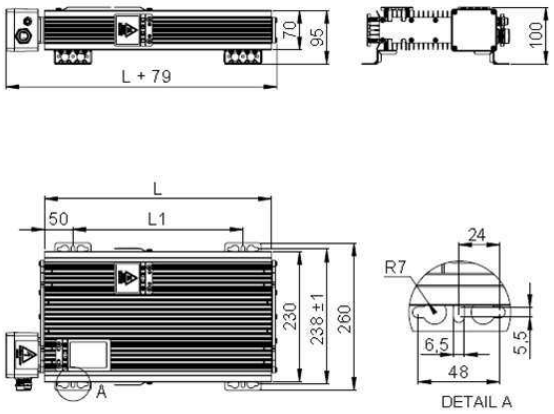
CBT-V ..G..3



PN	P 5/120*	triple-body style case with G-Box IP21	L ± 2	L1 ± 2	Weight (SiO2)	Resistance Range
kW	kW	Type	mm	mm	kg	Ω
3,0	70	CBT-H 400 D(H)(T) 2X3	400	300	25.5	0,36-460
4,2	90	CBT-H 460 D(H)(T) 2X3	460	360	29	0,4-530
5,2	120	CBT-H 560 D(H)(T) 2X3	560	460	33.5	0,5-33
6,3	140	CBT-H 660 D(H)(T) 2X3	660	560	39	0,6-40
7,2	165	CBT-H 760 D(H)(T) 2X3	760	660	44.5	0,66-50
8,0	185	CBT-H 860 D(H)(T) 2X3	860	760	51	0,76-60
9,0	220	CBT-H 960 D(H)(T) 2X3	960	860	57	0,86-60

* Pulse rating depends on resistance value

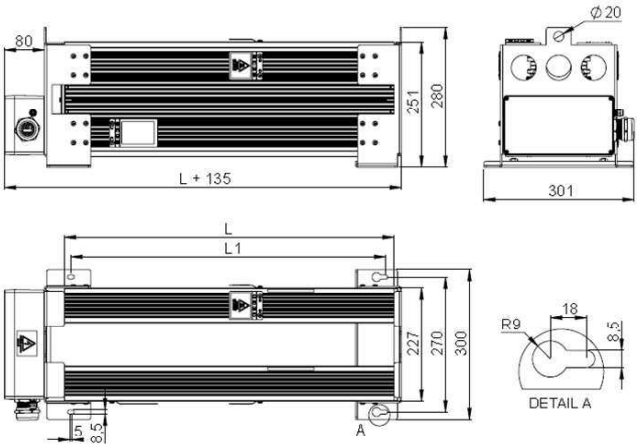
CBT-H ..B..1



PN	P 5/120*	single-body style case with B-Box IP65	L ± 2	L1 ± 2	Weight (SiO2)	Resistance Range
kW	kW	Type	mm	mm	kg	Ω
0,41	6	CBT-H 180 B(H)(T) 2X1	180	70	3,9	0,3-12
0,53	10.1	CBT-H 210 B(H)(T) 2X1	210	110	4,2	0.4-400
0,75	17,9	CBT-H 260 B(H)(T) 2X1	260	160	5,1	0,6-700
1,2	27.5	CBT-H 330 B(H)(T) 2X1	330	230	6,7	0,9-1000
1,4	37	CBT-H 400 B(H)(T) 2X1	400	300	8.2	1,1-1400
1,7	48	CBT-H 460 B(H)(T) 2X1	460	360	9.2	1,2-1600
2,0	58	CBT-H 560 B(H)(T) 2X1	560	460	11	1,5-110
2,47	69	CBT-H 660 B(H)(T) 2X1	660	560	12.8	1,8-130
2,9	82	CBT-H 760 B(H)(T) 2X1	760	660	14.6	2,0-150
3,3	95	CBT-H 860 B(H)(T) 2X1	860	760	16.8	2,3-180
3,6	111	CBT-H 960 B(H)(T) 2X1	960	860	18,6	2,6-200

* Pulse rating depends on resistance value

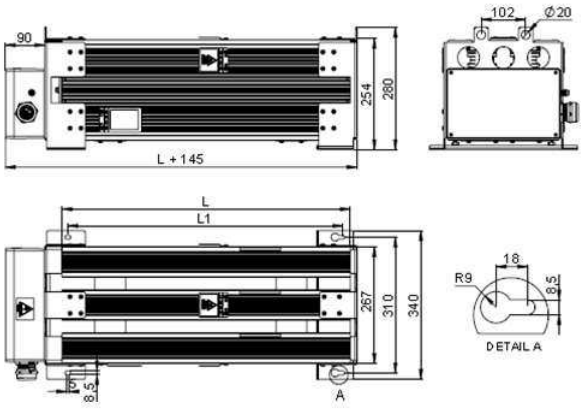
CBT-V ..B..2



PN	P 5/120*	double-body style case with B-Box IP65	L ± 2	L1 ± 2	Weight (SiO2)	Resistance Range
kW	kW	Type	mm	mm	kg	Ω
2,0	50	CBT-H 400 B(H)(T) 2X2	400	300	18	0,55-700
2,5	65	CBT-H 460 B(H)(T) 2X2	460	360	20.5	0,6-800
3,1	80	CBT-H 560 B(H)(T) 2X2	560	460	23.5	0,75-55
3,8	100	CBT-H 660 B(H)(T) 2X2	660	560	27	0,9-65
4,5	110	CBT-H 760 B(H)(T) 2X2	760	660	30.5	1,0-80
5,0	130	CBT-H 860 B(H)(T) 2X2	860	760	35.5	1,15-90
6,2	160	CBT-H 960 B(H)(T) 2X2	960	860	39	1,3-100

* Pulse rating depends on resistance value

CBT-V ..B..3

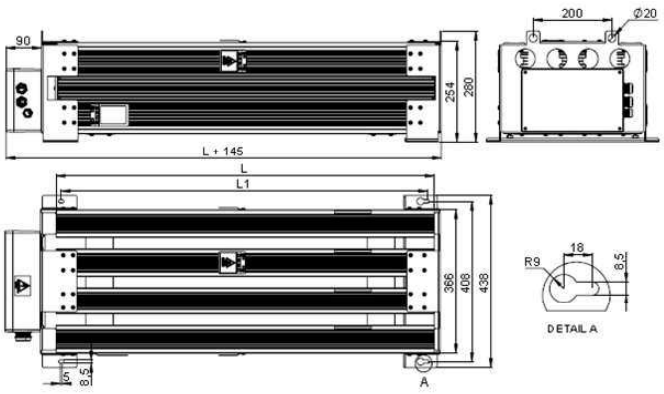


PN	P 5/120*	triple-body style case with BG-Box IP65	L ± 2	L1 ± 2	Weight (SiO2)	Resistance Range
kW	kW	Type	mm	mm	kg	Ω
2,8	70	CBT-H 400 B(H)(T) 2X3	400	300	25.5	0,36-460
3,8	90	CBT-H 460 B(H)(T) 2X3	460	360	29	0,4-530
4,7	110	CBT-H 560 B(H)(T) 2X3	560	460	33.5	0,5-33
5,7	130	CBT-H 660 B(H)(T) 2X3	660	560	39	0,6-40
6,5	150	CBT-H 760 B(H)(T) 2X3	760	660	44.5	0,66-50
7,2	170	CBT-H 860 B(H)(T) 2X3	860	760	51	0,76-60
8,1	195	CBT-H 960 B(H)(T) 2X3	960	860	57	0,86-60

Above tables are showing standard length.
Customer specified lengths avaiable

* Pulse rating depends on resistance value

CBT-V..B..4



PN	P 5/120*	triple-body style case with BG-Box IP65	L ± 2	L1 ± 2	Weight (SiO2)	Resistance Range
kW	kW	Type	mm	mm	kg	Ω
3,6	80	CBT-H 400 B(H)(T) 2X4	400	300	25.5	0,36-460
5,0	110	CBT-H 460 B(H)(T) 2X4	460	360	29	0,4-530
6,2	140	CBT-H 560 B(H)(T) 2X4	560	460	33.5	0,5-33
7,6	170	CBT-H 660 B(H)(T) 2X4	660	560	39	0,6-40
8,7	190	CBT-H 760 B(H)(T) 2X4	760	660	44.5	0,66-50
9,8	210	CBT-H 860 B(H)(T) 2X4	860	760	51	0,76-60
10,8	240	CBT-H 960 B(H)(T) 2X4	960	860	57	0,86-60

* Pulse rating depends on resistance value

connection boxes	IP rating	cable gland	clamping range	braid diameter (min.)	elec. connection
			[mm]	[mm]	[mm²]
B-box (single housing)	IP65	M25	9-16.6	7.5	0.75-10
D-box	IP21	M25	9-16.6	7.5	0.75-10
G-box	IP21	M40	19-28	15	2.5-50
B-box (multiple housings)	IP65	M32	11-21	9	2.5-50
B-box (multiple housings)	IP65	M40	19-28	15	2.5-50
thermal switch (optional)	-	M12	3-7	-	0.5-4

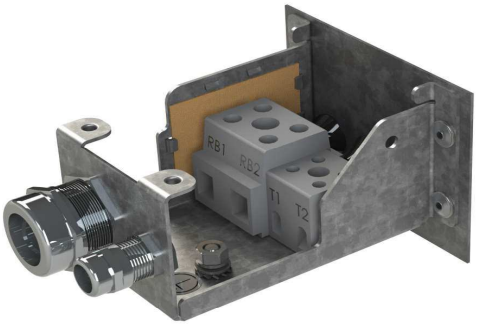
Other cable gland sizes on request

B-box

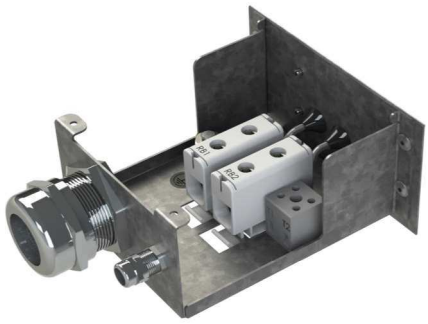
Single-body

B-box

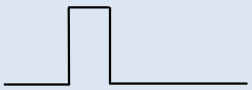
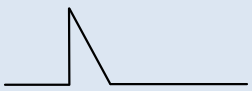
Multiple-housings



D-box



G-box

CBT-H Cx(T)	Square pulse each 120 seconds, ambient temp. = 40°C									
	duty 1 second [kW]	Max surface temp. [°C]	duty 5 second [kW]	Max surface temp. [°C]	duty 10 second [kW]	Max surface temp. [°C]	duty 20 second [kW]	Max surface temp. [°C]	duty 40 second [kW]	Max surface temp. [°C]
CBT-H 180 15R	18.4	110	5.1	140	3	160	1.9	180	1.1	220
CBT-H 210 100R	24.7	110	6.1	130	3.8	150	2.5	190	1.7	240
CBT-H 260 60R	44	130	10.7	150	6.4	180	4	210	2.7	270
CBT-H 330 40R	71	140	22	190	13	220	8	260	4.3	280
CBT-H 400 30R	105	160	30	210	18	250	10.7	290	5.4	280
CBT-H 460 20R	128	170	36	220	21	250	12	290	6.2	290
CBT-H 560 15R	190	200	50	250	28	280	15	300	7.6	300
CBT-H 660 14R	257	230	64	270	36	300	18	300	9.2	310
CBT-H 760 12R	315	240	78	290	43	310	21.5	310	10.7	310
CBT-H 860 10R	370	250	89	300	50	320	25	320	12.4	320
CBT-H 960 9R0	480	290	110	330	56	330	28	330	14	330
	Triangle pulse each 120 seconds, ambient temp. = 40°C									
	duty 1 second [kW]	Max surface temp. [°C]	duty 5 second [kW]	Max surface temp. [°C]	duty 10 second [kW]	Max surface temp. [°C]	duty 20 second [kW]	Max surface temp. [°C]	duty 40 second [kW]	Max surface temp. [°C]
CBT-H 180 15R	39	110	10.7	140	6.3	160	3.8	190	2.3	220
CBT-H 210 100R	50	110	12.7	130	7.7	150	4.9	180	3.2	230
CBT-H 260 60R	90	140	22	160	13	180	8	210	5	250
CBT-H 330 40R	148	140	46	200	27	230	16	260	8.5	280
CBT-H 400 30R	217	160	63	220	37	250	21	280	10.6	280
CBT-H 460 20R	265	170	74	230	44	260	25	290	12.3	290
CBT-H 560 15R	390	200	103	260	58	290	30	300	15	300
CBT-H 660 14R	530	230	134	280	73	310	37	310	18	310
CBT-H 760 12R	645	240	160	290	86	310	43	310	22	310
CBT-H 860 10R	578	260	183	300	98	320	50	320	25	320
CBT-H 960 9R0	983	290	226	330	113	330	57	330	28	330

The table above shows pulse power ratings for typical resistor sizes/lengths and typical Ohm values.

Pulse load

The ability to withstand pulse-loads varies according to resistor size, length and diameter of the internal resistor wire. As such, it is impossible to create standard graphs that would apply to all customer applications. In some cases, the load-profile will be the combination of a square and a triangular pulse, such as is the case with Low Voltage Ride Through (LVRT) and Emergency Brake situations, as encountered in the Wind Power industry.

On request, Danotherm performs simulations based on the actual application and for guidance, has produced tables for various load-profiles for resistors with standard wire. The above table shown is based on a resistor with indicated ohm value and standard wire thickness. Depending on the application, resistor construction can be adapted to optimally match the application. In the tables above, the peak powers of trains of rectangular and triangular pulses of 120 second periods are shown for durations of 1 to 40 seconds.

Ingress Protection

The Ingress Protection rating (IP) value depends on the resistor and on the connection style. The basic IP rating for resistors is IP 50 but by the addition of gaskets, they can be increased to IP 54 or IP 65 which is also possible for resistors with flying leads. For resistors with connection box type B, the maximal IP value is 65. Resistors with connection boxes D and G have an IP 21 rating when mounted vertically and IP 20 when mounted horizontally.

IP values and their type-tests are well defined; for instance “IP 65” means dust cannot penetrate the box or if dust occurs internally, it will not influence the electrical properties. It should be able to withstand water jets from any direction with a certain pressure during 3 minutes; however, it does not mean that it can withstand continuous rain. If the resistor is used outdoors, then it should be protected against direct rain.

IP 65 rated resistors can be cleaned with a high pressure hose, but this can only be done when the resistor has cooled down to the ambient temperature, otherwise the water will cool the housing causing a partial vacuum inside, drawing in water.

Danotherm offers standard solutions for one to four cases combined into one compact configuration with pulse-withstand capability of 1MW (5MJ) and also OEM versions with a maximum of 20 resistors. Depending on the electrical connection, the IP class ranges from IP 00 to IP 65. Connections can be via a terminal box, DIN-rail terminals or cable lugs. These resistor types are also offered in high voltage versions and with higher ohmic values.

The salient features of Alpha resistors are that they have:

- Small dimensions
- Cool surfaces in operation
- High pulse-load capabilities
- High vibration capabilities
- No external electrically-live parts
- High IP classes
- Fail-safe capabilities (on request)
- low noise levels.

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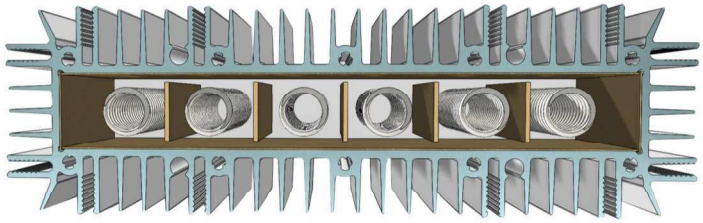
is a NIBE company

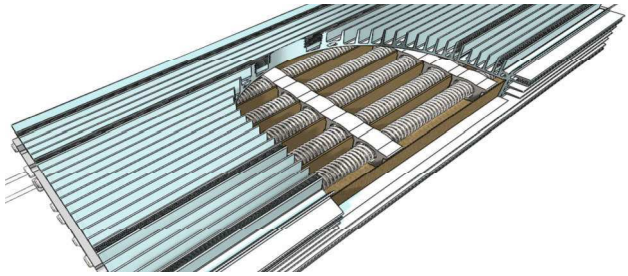


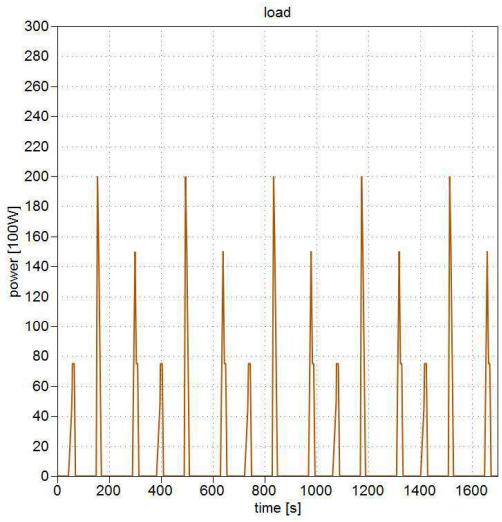


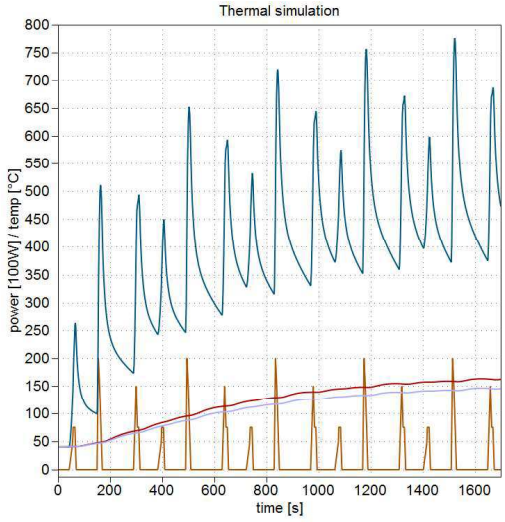
Danotherm has developed a thermal simulation method by which it is possible to optimize a resistor to a specified application. This gives following benefits

- Short and fast engineering time, saving engineering costs
- Simulation software for electrical circuits can be used for thermal simulations (PSpice, Matlab, Plecs or any other)
- Simulations can be done by the customer or if requested by Danotherm
- Simulation is based on customers application, any electrical circuit that can be simulated can be used
- For more complex loads a data file (like csv) can be used for input
- Optimizing the design, reducing overall size and costs
- Proof of capability is given without even building and testing samples







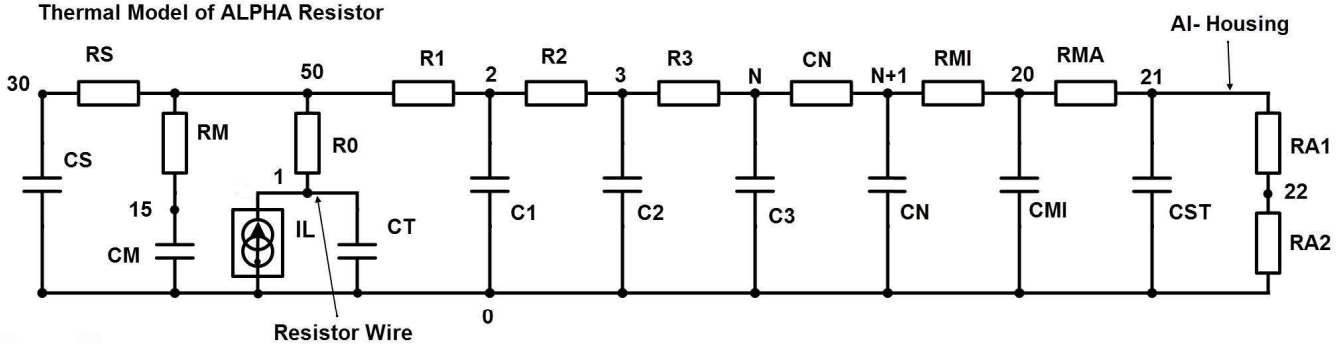


Measured on site: Brake Power stored in .cvs file.

Other possibilities could be a description of a typical or worst case brake pulse and a repeat cycle.

Simulation made by Danotherm

Results of temperature simulation of specified load in a suggested resistor type.

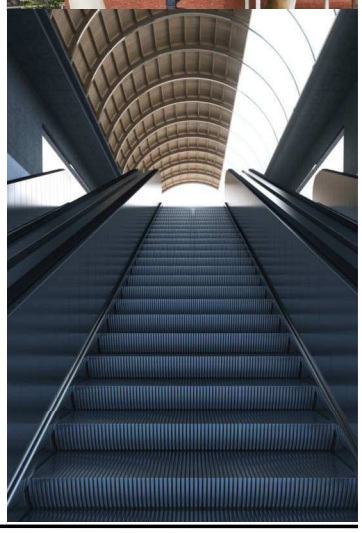


Danotherm resistors are used as:

- Pre-charge for DC-link (super) capacitors
- Pre-magnetization of power transformers
- Brake resistors for industrial drive systems
- Emergency stops in (gas) turbines

Danotherm resistors are used in:

- Elevators
- Escalators
- Cranes
- Vessels
- Wind turbines
- (Trolly)busses
- Trams / Metros / Trains (auxiliary circuits)
- Conveyer belts
- Transformers
- Turbines
- Excavation machines



Danotherm supports your request. The very start is your specification of the application, the load and environmental conditions. Ideally, a power-time graph is presented which forms the basis of the thermal simulation. If such graph is not available, the electrical circuit of the application is build in the simulation software. It is also possible to use a data file as input for the load. Such file can be build by measurements on the site or they come from another simulation software program.

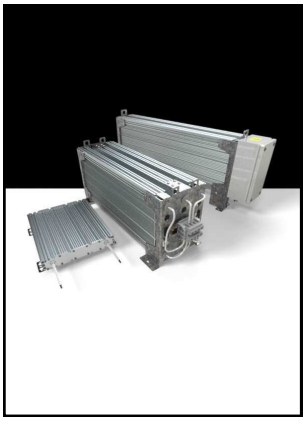
The next step is to feed the generated power losses into the thermal model. Each resistor which its physical properties has its own, unique, thermal model. With the simulation the temperatures inside the resistor and of the outside housing surface, are simulated. Here, the maximum temperature values are observed and at the same time care is taken not to over dimension the resistor.

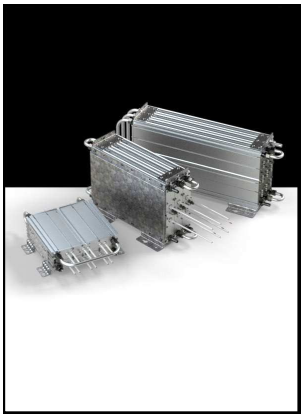
When the type and internal construction of the resistor is defined, the resistor will be further tailored to the customers needs. Connection boxes, connection cable sizes, cable glands, IP ratings, mounting brackets, metal surface treatment, auxiliary circuits, such as PT100 sensors and thermal switches, are all considered.

Finally, packing and shipping is an important topic. The resistors should be safely packed to prevent damage during transport and at the same time the costs for shipping and packing must be considered. Together with our customers the best option is chosen.

Other members of the ALPHA resistor family

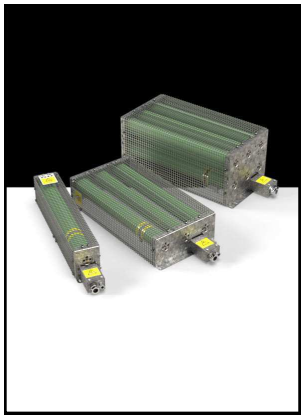


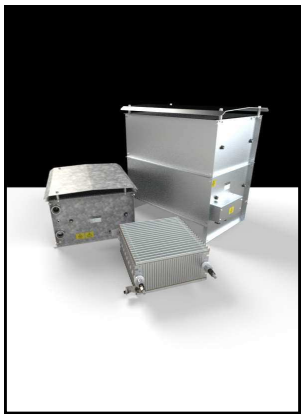




CAH / CAV: 55-190W	CBS: 300-3565W	CMQ: 800-4150W	CVS: 1575-4350W	CBW:1400-5700kW
CAR: 100-350W	Single Pulse brake	Single Pulse brake	Single Pulse brake	Repetitive Pulse and
CBH / CBV: 110-330W	resistor	resistor	resistor	continous
CCH: 100-570W				Water cooled
CBR: 220-1700W	Component and modules	Component and modules	Component and modules	Component and modules
General pupose	IP00-IP65	IP00-IP65	IP00-IP65	IP00-IP65
brake resistor	6.4-1100kJ (@5s)	160-2500kJ (@5s)	555-3100kJ (@5s)	6.4-1100kJ (@5s)
component	High Pulse load	High Pulse load	High Pulse load	High Pulse load and
IP50-IP65				short recovery time

Other resistor types from Danotherm




Sigma	Ohmega	WHHB / WHBS	Tera	Ohmega
Ceramic wirewound	Steel tube resistors	Water Cooled	Steel Grid	Water cooled
resistors	(Forced) air Cooled		Air Cooled	
IP00-IP20	IP20	IP65	IP13-IP23	IP65

CBT-H 400 CH(T) 2 8 1 22R KT

Last digits > 400: Customer specific version, otherwise:

- KT: Thermal drift; standard T=100ppm
- 22R: Tolerance; standard K=± 10%
- 1: Number of case style housings (1, 2, 3 or 4)
- 8: Thermal switch temp; 5=130°C / 6=160°C / 7=180°C / 8=200°C
- 2: 0=cable connection, 2=connection box type
- 8: Ohm value (Example 2R2=2.2Ω / 22R = 22Ω)
- CH(T): T=Thermal switch (normally closed)
- CH: Wire element (TBD by Danotherm)
- 400: Connection; C=no box / D=IP20 / B=IP65 box
- CBT-H: Length of resistor housing in mm
- CBT-H: H=horizontal mounting feet / V=vertical mounting feet

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